



UNITED STATES NAVY

MEDICAL NEWS LETTER

Vol. 37

Friday, 21 April 1961

No. 8

TABLE OF CONTENTS

MEDICAL DIGESTS

Dihydroxyacetone for Skin Tanning	3
Nasal Polyps	4
Cerebrospinal Fluid	5
Late Results of Hiatus Hernia Repair	8
Misconceptions in Radiation Therapy	10
Effects of Digitalis on the Non-Failing Heart	14
Quinacrine in Neoplastic Effusions	16

MISCELLANY

Needed: Wisdom, Experts, Safety in Radiology	17
My Name and Face Are on That Pin	19
National Foundation Assistance (BuMed Inst 6322.1A)	20
Requests for Outservice Training (BuMed Notice 1500)	20
Adenovirus Vaccine (BuMed Notice 6710)	21
American Board Certifications - Active Duty	21

MISCELLANY (Continued)

Recent Research Reports	22
From the Note Book	24

DENTAL SECTION

Resuscitation in the Dental Office	27
Dental Caries and Periodontal Disease	28
Temperature Standard Adopted by ADA Council	29
STAR Program	30
Personnel and Professional Notes	31

RESERVE SECTION

Officer Hump Problem Besets Naval Reserve	32
American Board Certifications - Inactive Reserve	34

AVIATION MEDICINE

Medical Aspects of Liquid Oxygen Contamination	35
Aviation Occupational Health Hazards	38

United States Navy
MEDICAL NEWS LETTER

Vol. 37

Friday, 21 April 1961

No. 8

Rear Admiral Edward C. Kenney MC USN
Surgeon General

Captain D. R. Childs MC USN, Editor

Contributing Editors

Aviation Medicine	Captain A. P. Rush MC USN
Dental Section	Captain W. R. Stanmeyer DC USN
Occupational Medicine	LCDR N. E. Rosenwinkel MC USN
Preventive Medicine	CDR J. W. Millar MC USN
Reserve Section	Captain D. J. O'Brien MC USN
Submarine Medicine	Captain G. J. Duffner MC USN

Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

* * * * *

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

* * * * *

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget (19 June 1958).

Dihydroxyacetone for Skin Tanning

Bertram Shaffer MD, Milton Cahn MD and Edwin Levy MD, Department of Dermatology, University of Pennsylvania School of Medicine, Philadelphia, Pa. The Use of Dihydroxyacetone for Skin Tanning. Arch Dermat 83:437-438, March 1961

Within recent years, a number of similar cosmetic preparations have appeared on the market which have been extensively advertised for their "tanning" effect on the skin. Many inquiries have been made regarding their effectiveness and safety. A general impression on the part of the laity exists that the artificial tan which these agents produce will protect against sunlight. The authors investigated the possible sun-screening properties and effect upon melanogenesis of dihydroxyacetone, the active ingredient in many of these preparations.

In controlled experiments it was found that dihydroxyacetone is not an effective screen against the sunburn action of ultraviolet light; and on histologic examination it was found that the chemical neither enhances nor diminishes erythema reaction or melanogenesis after ultraviolet light exposure.

According to the Pure Food and Drug Administration, lotions containing dihydroxyacetone reportedly give a browning effect without exposure to sun, although the reaction is not known. In addition, they state that from studies made, the drug is apparently free of significant dangerous effects when applied to the skin; no noxious reactions to the product have been reported. A few subjects have complained about a mottled and spotted appearance when the tan begins to wear off. The mottling seems to disappear within a few days if the skin is vigorously scrubbed with soap and water. A single instance of "skin itch," together with lesions of the index finger and the lip which allegedly resulted after use of dihydroxyacetone lotion, has also been noted. One woman complained of a bright orange color at the hairline after use of the preparation.

Presumably dihydroxyacetone in conjunction with glyceraldehyde undergoes oxidation by air to form a caramel related polymer with a brown color, thus imparting a stain to the outer layers of skin cells.

Considering the widespread use of this material and the absence of reports regarding toxic or allergic effects, it would appear that preparations containing dihydroxyacetone are reasonably safe under most circumstances. The only hazard seems to be a misunderstanding on the part of the public regarding skin protection against sunlight. The patient should be warned that, although a dihydroxyacetone preparation (not containing an effective sun-screen agent in addition) may give the skin the appearance of a suntan, it does not provide protection against sunlight exposure.

* * * * *

Nasal Polyps

Max Samter MD, Department of Medicine, University of Illinois College of Medicine, Chicago, Ill. Nasal Polyps: An Inquiry into the Mechanism of Formation. Arch Otolaryng 73: 334-341, March 1961.

In a recent essay on nasal polyps, Lederer called attention to the fact that nasal polyps have been discussed in medical history since earliest times, but that their ubiquity "serves only to remind us how little progress has been made toward solution of a vexing local manifestation of a constitutional disease."

General agreement exists that marked and prolonged edema of a vulnerable mucous membrane is the impairment of homeostasis which causes nasal polyps. Three possible types of edema have been proposed: allergic edema in which there is a dilatation of arterioles and capillaries; angio-spastic edema in which there is a vasoconstriction of arterioles and capillaries together with a vasodilatation of veins; and a venous edema resulting from impairment of the venous circulation.

It is tempting to consider nasal polyps a disease of the vascular bed. Increased capillary permeability and immigration of inflammatory cells can be produced by a variety of injuries; the final chemical mediator might be identical in conditions in which the initial injury differs. Increased capillary permeability, however, is only one of multiple etiologic factors. Ability of the loose connective tissue of the nasal mucous membrane to hold, as gel, large amounts of fluid has been emphasized. The chemical nature of the ground substance also plays a significant role in formation and character of polyps.

As a result of histochemical studies, it has been concluded that the response of the connective tissue is the same after either allergic or infectious injury; the common denominator, "inflammation," is characterized by the presence of large amounts of acid mucopolysaccharides. Additionally, increase in primitive fibroblasts in capillaries suggests that these primitive mesenchymal cells, as well as the endothelial cells, are active in formation of ground substance.

Most authors are inclined to assume that nasal polyps represent a manifestation of allergy. Although impressive support for this assumption exists, allergy as an etiology of polyps is not universally accepted. Hajos maintains that primary infection causes nasal polyps and that secondary allergic phenomena alter their appearance. Based on presence of eosinophils, Korkis divides nasal polyps into four groups, those due to: (1) pure allergy, (2) pure infection, (3) combined allergy and infection, or (4) uncertain—probably allergy.

A word of caution about eosinophils is indicated because it is conceivable that eosinophils do not represent the equivalent of antigen-antibody

reactions, but of certain effects of the antigen-antibody reaction on the tissue in which it occurs. If so, similar tissue changes might be induced by enzymatic action of nonallergic origin.

Majer, impressed by apparent relationship between nasal symptoms and systemic reactions, identified peculiar cells in granulomatous areas, although their significance was not clear. He speculated that these cells might represent an anatomic expression of the alleged and likely relation between nasal mucous membrane and the autonomic nervous system.

Of many questions which remain unanswered, one concerns the possibility that emotional stress might encourage formation of hypoplastic rhinitis and nasal polyps. Some studies indicated that hyperemia, hypersecretion, swelling, and obstruction of respiratory mucous membranes can be produced by cholinergic impulses which are transmitted by parasympathetic nerve endings. Such responses, if persisting, might encourage development of nasal polyps in patients who are unable to escape from a pattern of life which is reflected in impaired autonomic regulations of either gastrointestinal or respiratory mucous membranes.

After reviewing the evidence as it now exists, one might well agree that pathogenesis of the nasal polyp is still a puzzle, but that study of connective tissue and ground substance of nasal mucous membranes represents the most promising approach to its eventual solution.

* * * * *

Cerebrospinal Fluid

H. Bauer, Neurologische Universitätsklinik, Neurochemische Abteilung, Hamburg-Eppendorf, Deutschland. Cerebrospinal Fluid: Report on a Symposium. World Neurology 2:254-261, March 1961.

The author summarizes various conclusions reached at a symposium devoted exclusively to cerebrospinal fluid (CSF) proteins, held in Hamburg, Germany, June and July 1960.

The Blood-Brain Barrier

An ubiquitous exchange of CSF constituents through the CSF spaces exists; due to this exchange, no knowledge exists of the actual composition of the fluid secreted by the choroid plexus. An isotonic equilibrium between blood and nervous tissue must be considered as the driving force in CSF production. According to some investigators, nervous tissue has a higher osmotic pressure than blood. The process in the water metabolism of the central nervous system that requires energy is not production of CSF, but removal of water from the CSF spaces.

In addition to well established reabsorptive function of the arachnoid villi, the endothelium of the subarachnoid spaces and the collagenous fibers in the arachnoid and pia may be considered important for removal of water from the CSF. A further possibility is suggested that bundles of the collagenous fibers especially prominent in the basal cisterns and the spinal canal may, by swelling, lead to considerable water retention and explain some of the phenomena in various diseases of the brain and spinal cord—such as increase in protein content of CSF without change in the distribution of protein fractions, or development of arachnitis and occlusive swelling of the cisterns.

CSF Protein Determination

Results of CSF protein determination will differ from one laboratory to another in spite of similar technic; each laboratory must work out its own normal ranges.

The controversial question as to the diagnostic value of an increase of CSF beta globulin remained open in the course of the discussion. Reports indicate a tendency toward somewhat higher beta globulin values in degenerative and cerebrovascular disease, although no practical significance could be attached to the finding. One source considered an increase of beta globulin as a useful criterion in diagnosis of chronic noninflammatory diseases, slow degenerative processes, conditions following brain trauma, and schizophrenic defects.

Electrophoresis of CSF, while not contributing essentially to specific diagnosis, is opening the way to a more differentiated analysis of CSF reactions (barrier behavior, permeability changes, immunologic response) in the course of a disease and providing a basis for new types of examinations (immuno-electrophoresis, enzyme studies, isotope studies on the origin of CSF proteins, and antibody formation). Agar microelectrophoresis technic has certain advantages over free and paper electrophoresis; this technic should also be studied systematically under the aspect of its application to clinical routine diagnosis.

CSF Cytology

Under pathologic conditions, granulocytes from blood, lymphocytes, monocytes, plasmocytes, fibrocytes, and macrophages from leptomeningeal tissue as well as cells from the plexus and ependyma and tumor cells may be recognized. In one report, 31 of 89 cases of brain tumor (confirmed at operation or autopsy) exhibited tumor cells in the CSF; in 17 additional cases, the results were suggestive of neoplasia. Positive findings were most frequent in metastatic carcinoma. Another report stressed the fact that possibilities of tumor diagnosis from CSF cytology are limited. In

general, tumor diagnosis should never be made from occasional cells since granulomatous inflammation may produce similar morphologic variations. Demonstration of several mitoses, amitotic divisions, and elements suggestive of a tumor is considered obligatory for tumor diagnosis from CSF.

CSF Determinations in Neurosyphilis

Neurosyphilis is still an important problem; 3 to 5% of all neuropsychiatric cases seen in Berlin are of this type, the vascular forms of the disease being predominant today. For a reliable interpretation of CSF findings in neurosyphilis, parallel examinations of the blood are always necessary. A battery of reactions based on different antigens (lipid, protein, and spirochete antigens) should be performed. In one series of 15,631 examinations of CSF specimens, 7.19% had positive serologic reactions for syphilis. The highest percentage of positive reactions was found with the spirochete agglutination test, cardiolipin, CBR, Wassermann, and Meinicke clearing reaction, in the order named. The combination of the spirochete agglutination test and the cardiolipin CBR test was recommended for routine investigations.

Nonspecific CSF reactions (cell count, protein content, colloidal reaction, electrophoresis) may be considered as the more sensitive indicators of activity of the neurosyphilitic process. Another investigator expressed the opinion that the clinical findings and serologic test, especially when a quantitative evaluation of the latter is performed, may sometimes be better indicators of activity of the process.

CSF Investigations in Virus Diseases

In the present state of knowledge, cell counts in virus diseases of the central nervous system offer no diagnostic significance. Furthermore, one study showed protein values to yield no definite correlations; highest values were found in polio from the 14th to the 29th day of the disease. Increased gamma globulins in CSF electrophoretic patterns were often indicative of encephalitis in cases with a normal cell count and protein content. An increase of CSF glucose, occasionally noted in poliomyelitis, was not considered characteristic; CSF aldolase was increased in two-thirds of all cases of meningoencephalitis of viral origin. Virus isolation from CSF should always be attempted because of its greater etiologic significance in comparison to positive findings in stool.

From one source, acute serous meningitis is considered to be most frequently due to enteroviruses (polio, Coxsackie, and ECHO), mumps, herpes, and lymphocytic choriomeningitis. In experiments on monkeys, polio virus was present in CSF in most cases, with a definite time relationship between induction of viremia, virus content, and onset of paralysis. Infection of central nervous system tissue and CSF with polio virus from the

blood takes place at the same time, with a latency period until the manifestation of paralysis. Virus isolation from CSF in polio may be relatively unimportant for diagnosis because CSF is infectious only in the preparalytic stage.

* * * * *

Late Results of Hiatus Hernia Repair

Edgar S. Brintnall MD, Robert A. Blome MD and Robert T. Tidrick MD, Department of Surgery, College of Medicine, State University of Iowa, Iowa City, Iowa. Amer J Surg 101:159-163, February 1961.

Study of the late results of hiatus hernia repair was undertaken primarily because of interest in the mechanism and correction of secondary anemia due to blood loss associated with hiatus hernia. However, an important result of this study is confirmation of a growing belief that the long-term results of hiatal hernioplasty as measured by recurrence rate and relief of subjective symptoms leave much to be desired. Review was made of 100 patients with apparently symptomatic hiatus hernias who were operated upon during the 10-year period, 1947 to 1957.

Accurate classification of the hernias as sliding or para-esophageal types proved to be impossible. However, most were of the pulsion or sliding variety. Only a few were of unquestioned para-esophageal type with the cardia in a normal location below the hiatus.

It was found advantageous to categorize the patients into groups according to their dominant initial symptoms or findings: dyspepsia, bleeding, esophageal dysfunction, and pain of anginal type. The greatest number (50%) were classified as dyspeptic because of the nondescript nature of the symptoms—nausea, vomiting, epigastric discomfort, "sour stomach," vague cramps, fullness and belching, and specific food intolerance. Preliminary studies in this group ruled out peptic ulcer disease, cholelithiasis, and esophagitis; lower bowel studies were seldom performed. Bleeding was second in frequency (24%)—acute in 4 and chronic in 14—with the most common cause being diffuse esophagitis or esophageal ulcer. In one patient, the acute bleeding was from a gastric ulcer located within the herniated stomach. From observations, it seems that "hemorrhagic gastritis" of the herniated stomach without gross gastric ulcer, as well as esophagitis without gross esophageal ulcer, may be the source of chronic blood loss in patients with hiatus hernia.

Symptoms of esophageal dysfunction (regurgitation, dysphagia, and "sticking") were next in frequency (20%). In 4 of these patients, esophagitis had led to severe shortening of the esophagus so that unusual operative technics were employed. The least common complaint leading to hiatal

hernioplasty (5 patients) was lancinating pain in the anterior chest or epigastric region with radiation to the shoulder in 2 patients.

Results

In general, results of treatment of patients with significant esophageal shortening are disappointing. The only two operative deaths in the entire series occurred in this group.

Of a total of 39 patients in the dyspepsia category, late evaluation revealed that 24 considered themselves to be relieved of their symptoms, 4 stated they were significantly improved following hernioplasty, and 11 believed the operation had not benefited them. Most of the 15 patients, registered as unchanged or improved, were initially relieved following hernioplasty, but developed recurrent or new symptoms months or years later. Results were uniformly good in 14 patients who were operated upon because of chronic blood loss anemia. Of 4 patients operated upon for acute blood loss, 3 were relieved of symptoms; one had recurrent hematemesis from esophageal ulcer 12 years postoperatively.

Relief of symptoms was complete in 6 and incomplete in 7 of the 16 patients whose primary complaints were categorized as due to dysfunction of the esophagus. Three patients stated that the operation did not help them because dysphagia, regurgitation, or other symptoms recurred. Association of other abdominal disease (cholelithiasis and duodenal ulcer) was particularly frequent in this group of patients and may have some bearing upon the late results which are nearly as unsatisfactory as the results of treatment of the patients in the dyspeptic group. Only 6 of the 16 patients had lasting and complete relief of their initial symptoms of esophageal dysfunction.

The 5 patients who initially complained of severe chest and shoulder pain were uniformly relieved of the severe pain by repair of their hiatal hernias. However, 4 of the 5 patients complained of some discomfort and, therefore, are considered to be improved rather than completely relieved.

Despite optimism in evaluation of the results of treatment in all categories of patients, there is still a 19% failure to obtain symptomatic relief. If a pessimistic approach is used and good results are considered to have been obtained only in those relieved of symptoms, there is a 42% incidence of treatment failure.

It is noteworthy that, except for the bleeding category in which hemoglobin measurements were made, evaluation was of subjective complaints. Results were best in patients with acute hemorrhage and chronic anemia whose hemoglobins were evaluated objectively. Perhaps indifferent treatment results should have been expected upon late evaluation of this generally doleful group of aging patients with frequent associated gastrointestinal and biliary tract disease with a high incidence of obesity, poor tissue strength, and other degenerative disorders. Furthermore, evaluation is made difficult

by the apparent high incidence of functional overlay concerned especially in the dyspeptic patients.

Recurrence of hiatal hernia is more disturbing than lack of other good results. Late barium studies in 29 patients revealed recurrence diagnosed roentgenographically in 14 (48%). Incidence of recurrence bore no significant relationship to the surgical approach (thoracic or abdominal) or to the technic of hernioplasty. Curiously, the presence of recurrent hernia had no significant relationship to recurrence of symptoms.

It may be concluded that some factor concerned in recurrence of herniation and of symptoms is not being recognized consistently. Progressive tissue deterioration or increased intra-abdominal tension are factors which might be concerned, but these are influences about which little can be done.

Common Misconceptions in Radiation Therapy

Franz Buschke MD, Department of Radiology, School of Medicine, University of California, San Francisco Medical Center, San Francisco, Calif. Amer J Surg 101:164-171, February 1961.

In contrast to other medical specialties, clinical radiation therapy has matured from infancy into adult status within the lifetime of one generation. In many communities (even in recognized metropolitan hospitals and teaching institutions) physicians have never had an opportunity to observe competent radiation therapy. No wonder that erroneous conceptions regarding possibilities, limitations, and risks of radiation therapy remain prevalent in the minds of many physicians. It is not sufficiently appreciated that well recognized indications and contraindications have become established in radiation therapy which have the same validity as in surgery and other older specialties.

The optimist feels that radiation therapy "may be tried" in almost any situation, particularly when other methods have failed. Sometimes, it is considered as a convenient placebo. Some seem to believe that contraindication of surgery is almost synonymous with indication for radiation therapy. The pessimist, on the other hand, is unduly apprehensive of early and late morbidity associated with irradiation; he under-rates its rather consistent efficacy in properly selected cases. Brief analysis of commonly encountered misconceptions may arrive at a more realistic understanding of the situation.

Radiation Sickness

The problem of radiation sickness can be dispensed with rather easily. Twenty-five years ago, Coutard taught that the incidence of radiation

sickness is related to the incompetence of the radiation therapist. Radiation sickness, like the toxic effect of other potent drugs, can be prevented or minimized in most instances by adjustment of treatment technic to the tolerance of the individual patient. Patients frequently contract radiation sickness from the referring physician who has described it vividly, and they have become sick before treatment was begun. The reduced volume dose for the same tumor effect with supervolt therapy has further simplified the situation and has practically eliminated radiation sickness.

Cantril has pointed out that the problem of radiation sickness has become more serious since the advent of tranquilizers: "I find it increasingly more difficult to teach the concept of radiation sickness. . . . The increasing importance given to pharmacologic research to provide drugs which combat nausea, et cetera, really does more harm than good since the drugs cover up what may be an alarm reaction to unwarranted irradiation which could otherwise be adjusted to meet the situation." Symptoms of radiation sickness indicate that the limits of the patient's constitutional tolerance to radiation therapy are being approached. Such warning signals should be heeded in order to avoid deterioration of the patient's general condition which may reduce his resistance to tumor growth.

Late Complications

The most common objections to radiation therapy are based on supposedly unavoidable late complications associated with severe damage to the vasculo-connective tissue. But what does the record show?

In the author's experience with 583 patients treated for cancer of the cervix there were 7 (1%) clinically significant instances of bowel injury due to radiation damage of the vasculo-connective tissue. Radiumhemmet has reported rectal ulceration in 2.7% and rectovaginal fistula in 0.5% of 3392 cases of treated pelvic carcinoma. This is not consistent with expressions that "bowel injury following radiation treatment is not infrequent," nor with conclusions that the high incidence of "serious bowel injury . . . must be considered in an evaluation of surgical versus radiation therapy."

Furthermore, in the experience of the author, ureteral obstruction due to radiation fibrosis has not occurred following correct treatment of any form of pelvic cancer during the last 20 years; nor has fibrosis of the bladder occurred following external irradiation for carcinoma of the bladder (or other pelvic organs) with doses of 5000 to 6000 r delivered in 6 to 8 weeks. Severe fibrosis of the bladder has been observed more frequently following intracavitary irradiation using either a central source or radioactive solution. It is now recognized that heroic attempts to force the issue by exceeding the bladder tolerance lead to a point of diminishing returns and discredit radiation therapy of carcinoma of the bladder which, if properly conducted, plays an ever increasing role with well recognized indications.

Difficulty of later surgery in heavily irradiated tissue is stressed again and again. This attitude, too, is not justified. Radical surgery is quite possible following radical radiation therapy without complications beyond those associated with such radical surgical procedures alone. Baclesse concludes from his experience: ". . . if the radiotherapist's technique has been correct—small fields with fractionated dose—it is possible in case of failure to do a total laryngectomy under almost as good conditions as if the operation were to have been done primarily."

The common denominator of all these dreaded injuries is radiation damage to the vasculo-connective tissue. The greatest progress in radiation therapy during the last 20 years lies in increased ability, which was acquired empirically, to protect the vasculo-connective tissue by two technical modalities: greater fractionation of treatment in time, and supervolt therapy. Greater fractionation is probably the more important. Sufficient protraction of treatment time significantly and often critically increases the differential between tumor vulnerability and that of the normal structures which is the aim of successful radiation therapy.

That lesions closely overlying cartilage or lesions originating in the more sensitive mucous membranes, such as vulva, female urethra, or anus, cannot be treated by radiation therapy because of the low tolerance of these tissues is still a commonly encountered error. In addition to the necessary protraction of therapy, it is even more important in these situations to select the optimal quality of radiation.

That lesions in the region of the eye can be treated by radiation therapy with complete protection of the eye is well recognized by experienced therapists and surgeons. Excellent cosmetic results are obtained with even large carcinomas involving the eyelids where radiation therapy in many instances has undoubted preference over plastic surgery.

The problem of development of cancer in irradiated tissues is closely related to the problem of severe damage to tissue. Most cancers that can be interpreted as late radiation effects have occurred in severely changed tissues with the tissue damage present for a long period of time. Its occurrence following technically correct radical therapeutic procedures is extremely rare, and the interpretation in many recorded instances is debatable.

From a critical analysis of material available both in the literature and in personal experience, it is safe to state that the incidence of cancer induced by radiation following a single course of technically correct therapy is so small that it should not enter into clinical considerations. After all, as Osler stated, medicine is "an art which consists largely in balancing probabilities."

Radiosensitivity and Cancerocidal Dose

Experienced tumor pathologists admit that there is nothing in the microscopic structure which in itself indicates the degree of radiovulnerability. From

hearsay, they have learned that certain histologic varieties of tumors respond and others do not. "Radioresistance" of adenocarcinomas as contrasted to "radiosensitive" epidermoid carcinomas is still frequently assumed. Time has indeed proved that radiotherapy measured by curability has accomplished its most consistent success in treatment of epidermoid carcinomas. However, it is not true that glandular carcinomas are less responsive; it has been learned that the reasons for preferring surgery in operable adenocarcinomas are other than their radiovulnerability which is often as great as, and sometimes greater than, that of some of the epidermoid carcinomas. It is important to recognize the reasons for surgical preference because radiation therapy may still have a very useful place in inoperable situations for palliation or retardation of the disease in many glandular carcinomas.

Another favorite fallacy is assumption of a parallel between the degree of histologic differentiation and radioresistance, particularly of epidermoid carcinomas. The gross characteristics of a lesion which cannot be correctly interpreted from the histologic analysis of a small biopsy often permit a more accurate appraisal of the anticipated response than the histologic structure. The particularities of the tumor bed and the precise point of origin of a neoplasm may be of far greater importance for its radiovulnerability than the histologic type or differentiation.

The terms "radiosensitivity" and "radioresistance" are relative—if they mean anything—from a prognostic point of view. Improvements in technics and availability of supervoltage therapy have greatly altered this consideration. Finally, it is impossible to predict the response and prognosis in the individual case prior to observation of actual changes as observed during treatment, even for those tumors which are generally considered readily amenable to radiation therapy.

These observations also imply that there is no known cancerocidal dose for any particular tumor. In general terms, the approximate level of dose needed to destroy tumors of certain histologic varieties is known. But the dose must be individualized and effectiveness appraised by careful observation.

The mystic figure of 6000 r has somehow appeared recently as a cancerocidal dose for most epidermoid carcinomas as well as for some other neoplasms. This figure may represent an approximate ceiling for safety, but does not indicate the dose necessary for tumor control.

Conclusions

Some of the more commonly observed misconceptions have been reviewed. One fundamental error from which many of the others probably derive is the idea that radiation therapy is merely a physical science; that its purpose is to introduce as accurately as possible a prescribed amount of physical energy into a certain volume of the human phantom for treatment of a tumor catalogued as "radiosensitive." This erroneous interpretation has two

consequences: it leads to an exaggerated emphasis on the importance of the machine available without appreciation of the fact that the prognosis is determined in decreasing order of importance by the biology of the disease, the competence and skill of the therapist—and least significantly—by the apparatus; it explains the remarkable situation in which the pathologist, surgeon, neurosurgeon, gynecologist, orthopedist, dermatologist, and the laryngologist seem to have a more thorough knowledge of the indications and technics than does the radiotherapist, and often believe themselves to be competent to supply him with quite detailed prescriptions which have been gathered from the literature.

Exact physical control is essential, but must be subordinated to skilled clinical judgment comparable to the place of anesthesiology in surgery or pharmacology in medicine. Clinical radiation therapy is essentially not a physical science but a clinical art. The therapist is primarily a physician who must understand and appreciate the intricacies, vagaries, and unpredictabilities of a biologic system.

Undoubtedly, many of the cited misconceptions among radiologists and other physicians are based on observation of, and experience with, inadequately executed radiation therapy. With continued improvement of radiation therapy itself, particularly through training of a greater number of competent therapists and organization of more departments of radiation therapy in the larger hospitals, the trend toward better understanding of the place of radiation therapy in treatment of cancer will undoubtedly continue.

* * * * *

Effects of Digitalis on Non-failing Heart

E. Braunwald, et al, National Heart Institute, National Institutes of Health, Bethesda 14, Md. Studies on Digitalis. IV. Observations in Man on the Effects of Digitalis Preparations on the Contractility of the Non-Failing Heart and on Total Vascular Resistance. J Clin Invest 40:52-59, January 1961.

Observations in the laboratory have led to the view, now generally accepted, that the salutary clinical and hemodynamic effects of digitalis in congestive heart failure result primarily from its direct stimulation of myocardial contraction. Considerable confusion still exists, however, concerning the effects of digitalis on the non-failing heart since in the absence of clinical heart failure, acute digitalization either depresses the cardiac output slightly or produces no significant change in any hemodynamic parameter. Such observations have led to the contention that digitalis does not stimulate the non-failing human heart.

The authors investigated the direct effects of digitalis preparations on the contractile force of the non-failing human heart as measured with the Walton-Brodie strain gage arch. Most of the observations were carried out with the patients on cardiopulmonary bypass incident to heart surgery for atrial septal defect or pulmonic stenosis.

Results observed—previously reported for animals—demonstrated that acetylstrophanthidin and lanatoside C produce a substantial augmentation of the force of ventricular contraction when they are administered to patients who are not in heart failure.

Although digitalization was found to augment the force of contraction in chronically stressed non-failing hearts, the possibility that the stimulating effects are of different intensity in failing hearts or in entirely normal hearts has not been excluded. The concept that digitalis glycosides either have no effect on the non-failing heart or actually depress its contractility arose from observations which showed that these drugs neither modify nor decrease the cardiac output in both the dog and man.

The observation that digitalis profoundly augments the contractile force of the non-failing heart without elevating its output serves to reemphasize the view that alterations of cardiac output are of little value in predicting changes in myocardial contractility. The effects of norepinephrine on the human heart are somewhat analogous, since this drug increases myocardial contractile force without raising cardiac output. In the case of digitalis, it is possible that the actions of the drug on the peripheral circulation may be responsible for the discrepancy between the changes in cardiac output and in myocardial contractile force. In the dog, digitalis results in constriction of the hepatic venous sphincter with trapping of blood in the splanchnic bed and elevation of portal venous pressure. The resultant decline in ventricular filling pressure prevents increased contractility from expressing itself as an increased cardiac output. A similar mechanism may operate in the human subject without heart failure and account for the dissociation between myocardial contractile force and cardiac output.

In view of the positive inotropic effect of digitalis on the non-failing heart, the fear of cardiac depression when these drugs are used "prophylactically" would not seem to be warranted. Thus, exhibition of cardiac glycosides does not appear to be contraindicated in patients without overt heart failure in whom the development of heart failure is feared because of the superimposition of an excessive hemodynamic burden resulting from an acute infection or surgical procedure. Rather, demonstration in the present study of the substantial augmentation of contractile force provided by digitalis has led to the establishment at the National Heart Institute of a policy to digitalize all patients prior to intracardiac surgery.

* * * * *

When listening to heart murmurs you must tune up your auditory hair cells and flatten out your Pacinian corpuscles. —Osler

Quinacrine in Neoplastic Effusions

A. Gellhorn MD, J. Zaidenweber MD, J. Ultmann MD and F. Hirschberg PhD,
College of Physicians and Surgeons, Columbia University, New York, N. Y.
The Use of Atabrine (Quinacrine) in the Control of Recurrent Neoplastic
Effusions. Dis Chest 39:165-176, February 1961.

It has been found that quinacrine has a cytotoxic action on a variety of tumor cells in tissue culture in concentration as low as M/50,000. However, adequate concentration in tissues and tumors in vivo is not possible without forbidding host toxicity. When injected intraperitoneally in mice, it was discovered that the drug did produce cytotoxic effect on tumor cells when in sufficient concentration. From this observation, it was thought that the compound might be useful in control of neoplastic effusions by direct instillation into involved cavities; the authors clinically investigated this hypothesis. Thirty-one patients were selected for evaluation: 21 had recurrent pleural effusions secondary to metastasis from carcinomas of the breast and lung, lymphoma, and mesothelioma; 10 patients had recurrent ascites secondary to ovarian, colon, pancreas, stomach, and breast carcinomas and mesotheliomas.

Eight of the patients with pleural effusion received effective control as a result of instillation of quinacrine intrapleurally; 9 died less than one month after treatment, all having been in far advanced stages of disease. Five of the peritoneal effusions received effective control.

As evidence of toxicity, fever and regional pain were the two most common reactions. The temperature became elevated within 4 to 8 hours after drug injection and persisted from a few hours to as long as 10 days. The pain was not severe and was controlled with analgesics with or without codeine, and it was considered to be due to pleural or peritoneal inflammatory response. The duration of regional discomfort was usually shorter than the fever. Initial smaller doses are suggested to eliminate or minimize these symptoms.

More significant reaction to the drug was formation of adhesions between the visceral and parietal pleura due to contraction of thickened, encasing pleura with concomitant reduction in lung volume. Because of this, caution should be exercised in treatment of bilateral effusions.

Studies of the peripheral blood, liver function, and renal function failed to reveal any instance of systemic toxicity.

In management of serous cavity effusions due to metastatic disease, there are some critical considerations to be made. First, it is important to determine which of three major mechanisms is the most important factor in pathogenesis of the effusion since the treatment regimen will be selected from such an analysis. They are: (a) serosal metastases, (b) lymphatic obstruction centrally with distal transudation, and (c) cardiovascular, renal, or nutritional decompensation whether secondary to the neoplasm or unrelated.

When it has been demonstrated that the serous surfaces are directly involved, first consideration should be given to those available forms of treatment which may modify the natural history of the disease. When, however, the tumor is refractory to more definitive measures and the effusion has been found to be recurrent, local therapy then becomes appropriate.

At the present time, local control of neoplastic effusions may be accomplished by radioactive isotopes, alkylating agents, and other chemical agents, such as quinacrine. The latter combines the advantages of low cost, ready availability, and absence of systemic toxicity with demonstrated effectiveness in control of effusions caused by various types of tumors. It is to be emphasized, however, that this treatment, at best, offers relief of a symptom and will not fundamentally modify the natural history of the underlying neoplastic disease.

• * * * * *



• MISCELLANY

Needed: Wisdom, Experts, Safety in Radiology

Radiation in Medicine: how to use it wisely, expertly, and safely. These are the continuing educational goals pursued in the United States by the American College of Radiology and by individual physician-specialists who, as radiologists, make up the membership of this professional society of physicians.

These goals have received more emphasis recently through a wider public awareness of what radiation is, how it is used, and what it can do. This awareness among the public is largely the result of the increasing use of radiation in the atomic age and concern about the average radiation dosage to the reproductive organs throughout the entire U.S. population.

Various groups of radiologists are studying the problem; suggestions for further minimization of radiation exposure during x-ray examinations are presented by the Pacific Roentgen Society:

1. Adherence to principles of radiation protection outlined in the NBS Handbooks, with particular attention to coning in all diagnostic procedures, filtration of the beam, and utilization of lead protectors, especially over gonadal areas.
2. Reevaluation of the necessity for certain fluoroscopic procedures, and elimination of others. Reduction in dose by attention to the following:

- a. Adequate dark adaptation (20 minutes).
 - b. Adequate filtration of fluoroscopic beam.
 - c. Reduced frequency of chest fluoroscopy. The procedure is of value in determining intracardiac calcification, diaphragmatic excursion, and occasionally localization, but should no longer be considered as a routine or follow-up procedure.
 - d. Shortened over-all fluoroscopic time. Fluoroscopy of the gastrointestinal tract and spinal canal is primarily to observe mobility of the contrast material and as an aid to spot filming. Efforts to shorten the time for these observations should be made.
 - e. Abolition of routine chest fluoroscopies in diagnostic clinics, particularly well baby clinics.
 - f. Abolition of fluoroscopy in routine fracture work.
 - g. Caution in use of image intensifiers—ease in their use can lead to excessive use.
3. Reduction of radiographic films whenever possible:
 - a. Pelvimetry can often be limited to two films.
 - b. Films not necessary for the diagnostic procedure can be eliminated; multiple documentation is not routinely essential.
 - c. Reduction of number of films in intravenous urography, in fracture work, and in hip disorders, especially in persons under 40 years of age.
 4. A photoroentgen unit should be used primarily in areas or groups with high incidence of tuberculosis. It should not be considered a routine aid in diagnosis of lung cancer or cardiac disease. Utilization as an admission chest film unit in private hospitals is now open to question on account of small yield and dose sustained. Utilization in private and state colleges is likewise open to question in view of larger dose received as compared to conventional film technic.
 5. In therapeutic radiation of benign lesions, protective measures against scattered radiation to the trunk should be used.
 6. The radiologist should ask an x-ray physicist to make a periodic check of all diagnostic units in his department. He should know the fluoroscopic output and total filtration in all tubes. He should be alert in guiding his technicians in safe diagnostic technics. This may be supplemented by checks with film badge or pocket iometers.

All of these educational efforts are pointed toward using this invaluable medical examination and therapy medium wisely, expertly, and safely. (Editorial, Your Radiologist, American College of Radiology, Winter 1960)

* * * * *

My Name and Face Are on That Pin

Jim Parker, writing in Navy Times of January 7, 1961, dramatically describes the effective device employed by one Navy facility for impressing safety practices in driving. Appreciation is expressed to the Editor, Navy Times, for permission to reprint this article.

On the sun visor of my car there is a little pin. It's just an ordinary map pin, about a half-inch long with a big colored head on it.

The pin isn't connected to any other part of the car—just stuck into the sun visor, right in front of my eyes, where I can glance at it any time.

That pin could save my life . . . or yours.

It may be the most important safety device on the whole car.

The pin has no mechanical function, yet it might have more to do with stopping my car in time than the brakes do.

It isn't a governor, but it might keep my car from going faster than the law or common sense allows.

It isn't a part of the steering system of my car, yet it might keep my car from driving on the wrong side of the road, or driving off the road into a tree.

The little pin weighs a fraction of an ounce, but it might keep my ton-and-a-half car from plowing head-on into another roaring mass of steel and glass at 80 miles per hour.

You can't read it, but my name is on that pin. My eyesight isn't any better than yours, but I know my name and my face are on that pin. I can see it.

I sat in on a class in driver training given by C.H. Taylor, equipment operator first, attached to the Potomac River Naval Command's Operation Safe Drive office at the Naval Station in Anacostia.

Part of the classroom instruction was the showing of a movie called "The Case of Officer Hallagrand." It depicts the true events of one day in the working life of a traffic enforcement officer.

Each time an accident occurs in the film, a map pin similar to the one stuck in my sun visor is placed on a large city map at police headquarters. "We got plenty of pins," one of the officers says.

Officer Hallagrand tells his colleagues that maybe, to them, they are just pins, but to him the pins are names and faces of people he knows—or knew, before they died horribly in auto accidents.

Before viewing the film, each man in the class is given one of these pins.

As the picture ends, after showing a day of highway death and destruction, the narrator says: "Yes . . . they have plenty of pins. One of them is for you unless you have learned that careless driving means sure destruction."

I brought my pin with me. As long as I can see it, stuck safely in my sun visor, it won't be going up on a police headquarters map, marking the space where I crashed and died.

And every time I glance up and see it there, I believe it will help keep my car on my side of the road, traveling at a safe speed.

When I'm tired and sleepy, maybe my dozing eyes will catch sight of it and remind me to pull over and skip driving until I have rested properly.

When I'm impatient at other drivers, or irritated at their real or fancied breaches of driving etiquette, maybe it will say to me, "Calm down, old boy. You have plenty of time to get where you are going—and get there safely."

Yes, that pin of mine just might keep me from becoming a statistic—a digit in the number of highway deaths attributable to driver failure.

* * * * *

BUMED INSTRUCTION 6322.1A

27 March 1961

Subj: Arthritis, birth defects, and poliomyelitis victims; patient aid provided by the National Foundation

Anyone legally residing in the United States or its possessions, or any American citizen living or visiting abroad, who requires financial assistance in the medical care and treatment for subject diseases or defects is eligible for help, subject to the requirements established by the National Foundation. While the Foundation does not dispense charity, they do give assistance when the cost of care incident to management of subject diseases would be oppressive. When medical care is not available at Uniformed Services Medical Facilities or under the Medicare Program, or when necessary equipment and specialists are not at hand, application for aid may be made to the National Foundation. Procedures for such applications are outlined.

* * * * *

BUMED NOTICE 1500

24 March 1961

Subj: Requests for part-time outservice training and for attendance at courses of instruction and meetings

This notice reemphasizes the importance of submitting requests for subject training and meetings in sufficient time to permit orderly administrative handling. In general, it is desired that such requests arrive at the Bureau of Medicine and Surgery either 3 or 4 weeks in advance of commencement dates, as specifically stated in the directive.

BUMED NOTICE 6710

3 March 1961

Subj: FSN 6505-577-4145, ADENOVIRUS VACCINE, BIVALENT, 30 cc;
use of

Acute respiratory disease due to adenovirus type 4 or 7 infections is practically limited to military recruit populations; it is rare in other adult populations. Vaccines containing these specific adenovirus antigens are highly effective in preventing illness due to type 4 adenovirus in military recruits. Therefore, subject vaccine is expected to have no effect on acute respiratory disease in the general population. This directive provides that requisitions for subject vaccine for use in personnel other than military recruits will not be approved unless it is shown by appropriate virologic or serologic tests that types 4 or 7 adenovirus infections are a significant cause of illness in the group for whom the vaccine is intended.

* * * * *

American Board Certifications - Active DutyAmerican Board of Internal Medicine

LCDR William J. Jacoby Jr, MC USN

American Board of Ophthalmology

LT Edward K. Isbey JR, MC USNR

LT Robert V. Spurney MC USNR

American Board of Orthopedic Surgery

LCDR Harold R. Noer MC USN

LCDR George F. Risi MC USN

American Board of Otolaryngology

LT Phillip I. Moser MC USNR

LT Blair M. Webb MC USN

American Board of Pediatrics

LT Joseph C. Blanton MC USNR

LT Chester M. Edelmann Jr,
MC USNRAmerican Board of Radiology

LT Truman G. Daughtridge MC USN

LT Carl W. Rogers MC USN

LT Thomas P. Moore MC USN

LT Bernard S. Yurick MC USN

American Board of Radiology in Nuclear Medicine

CDR Lorrain E. Watters Jr, MC USN

American Board of Surgery

LCDR Ivan S. Altman MC USN

LCDR Robert W. Love Jr, MC USNR

LT Walter Y.M. Chang MC USNR

LT Ernest H. Meese MC USNR

* * * * *

Recent Research ReportsU. S. Naval Medical Research Institute, NNMC, Bethesda, Md.

1. Pharmacological Studies on Irradiated Animals. VIII. Some Paper Chromatographic Analyses of Cell-free Spleen Extracts Protecting Against Radiation Death. MR 005.08-1300.03 Report No. 3, 8 July 1960.
2. A Comparison of the Effect of General Hypothermia and Arfonad Induced Hypotension on Survival of Dogs following Temporary Acute Occlusion of the Portal Vein. MR 005.12-0002.02 Report No. 1, 8 July 1960.
3. Labilization of Ester Bonds in Aminocyclitol Derivatives II. Polyacetates of Deoxystreptamine. MR 005.06-0010.01 Report No. 19, 8 July 1960.
4. The Experimental Host Range of the Arthropod-Borne Animal Viruses in Arthropods. MR 005.09-1401.03 Report No. 1, 8 July 1960.
5. Copolymers of Adenylic and Uridylic Acids. MR 005.06-0001.01 Report No. 12, 19 August 1960.
6. The Acute Radiation Syndrome in Dogs Following Total-Body Exposure to a Supralethal Dose of Ionizing Radiation (Co^{60} LD 100/88 Hours). MR 005.08-1300.08 Report No. 1, 19 August 1960.

U. S. Naval Medical Research Unit No. 3, Cairo, Egypt

1. Diarrhea in an Alien Student Population in Cairo, U. A. R. MR 005.09-1202.3.01, June 1960.
2. Improved Electrophoretic Resolution of Alkali-Resistant Hemoglobins in Starch-Gels Using Colloidal Electrolytes. MR 005.06-0051.2.02, June 1960.

U. S. Naval Air Development Center, Johnsville, Pa.

1. NADC Biological Instrumentation Symposium of 10 December 1958; seventh letter report concerning. MR 005.15-0002.2, 12 July 1960.
2. Immunochemical Studies on Mitochrome. MR 005.15-0002.7 Report No. 10, 11 August 1960.
3. Hormonal Determinants of Mammalian Tolerance to Acceleration Stress. MR 005.15-0002.7 Report No. 11, 12 August 1960.
4. X-Ray Diffraction Studies of Cytosine, Uracil and Thymine. MR 005.15-0002.11, 30 August 1960.

U. S. Naval Medical Research Laboratory, Submarine Base, New London, Conn.

1. Selecting a Space Cabin Atmosphere. MR 005.14-3300-5.03 Report No. 323, 19 October 1959.
2. Nature of the Limit of the Color Zone of Perimetry. MR 005.14-1001-1.09 Report No. 324, 20 October 1959.

3. Physiological Problems of Submarine and Space Medicine. MR 005.14-3300-5.04 Report No. 327, 25 January 1960.
4. Effect of Contact Lenses on the Red/green Ratio. MR 005.14-1001-1.12 Report No. 328, 26 January 1960.
5. Intrapulmonary Air Trapping in Submarine Escape Training Casualties. MR 005.14-3100-2.01 Report No. 330, 15 February 1960.
6. Absolute Visual Threshold (1) For Extremely Wide Fields, (2) and In Relation to Age. MR 005.14-1001-1.13 Report No. 331, 15 March 1960.

U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1. Ischemic Heart Disease and Accelerated Cardiovascular Aging: A Ballistocardiographic Study. MR 005.13-7004 Subtask 6 Report No. 9, 31 July 1960.
2. Visual Perception of the Horizontal During Prolonged Exposure to Radial Acceleration on a Centrifuge. MR 005.13-6001 Subtask 1 Report No. 54, 18 August 1960.
3. Feasibility Studies for Hearing Conservation Program Aboard CVA-Type Aircraft Carriers. MR 005.13-2005 Subtask 1 Report No. 8, BUWEPS Problem Assignment No. AO4AE 13-3 Report No. 1, 26 August 1960.

U.S. Naval Medical Research Unit No. 2, Taipei, Taiwan

1. Bacterial Conjunctivitis Caused by a Base Eye Ointment Used as a Placebo. MR 005.09-1201.12 Report No. 4., 18 May 1960.
2. Summaries of Research, 1 July 1959 - 30 June 1960.
3. A Complement Fixation Antigen for the Serological Diagnosis of Trachoma. MR 005.09-1201.12 Report No. 6, 1 July 1960.
4. The Serological Relationship of Trachoma, Psittacosis, and Lymphogranuloma Venereum Viruses MR 005.09-1201.12 Report No. 3, 1 July 1960.
5. Titration of Asian Influenza Neutralizing Antibody by Use of Hemadsorption Inhibition in Tissue Cultures. MR 005.09-1201.4 Report No. 5, 15 July 1960.
6. Encephalitis on Taiwan. I. Introduction and Epidemiology. MR 005.09-1201.2 Report No. 1, 1 October 1960.
7. Acanthocephala from Shore Birds of Egypt with the Description of a New Species of Mediorhynchus. Special Report No. 16, 31 October 1960.
8. Cholera and the Sodium Pump. MR 005.09-1040.1.7, 1 November 1960.
9. Potassium in the Treatment of Cholera. MR 005.09-1040.3 Report No. 2, 1 December 1960.

U.S. Naval Dental Research Facility, Great Lakes, Ill.

1. Clinical Significance of Pleuropneumonia-Like Organisms in the Oral Cavity. MR 005.12-5004, June 1960.
2. Group D Streptococci in Saliva. MR 005.12-5004, September 1960.

From the Note Book

Comments Invited. In this issue the Aviation Section has been presented in a typographic style different than that regularly used by the News Letter. It has been the editor's opinion for some time that, in view of the obvious and proven ability to read a short line more quickly and easily than a longer line which requires several changes of focus, a change in style would be appreciated by the readers. However, because the News Letter is prepared for printing by office typists, there was some apprehension that the two-column page with two irregular right margins would appear unattractive. Comments are invited from readers, both as to the physical appearance of the page as well as to readability of the shorter line. Address: Editor, Medical News Letter, Bureau of Medicine and Surgery (Code 18), Department of the Navy, Washington 25, D. C.

Japanese Commend Sasebo Hospital. The Japanese Maritime Self-Defense Force recently presented a letter of commendation to the U. S. Naval Station Hospital, Sasebo, Japan, in appreciation of the professional skill and care extended by the hospital staff in saving the life of a Seaman of the Maritime Force. Seaman Nakahara, having sustained traumatic amputation of both legs by a train in Sasebo Railroad Station, was rushed to the Station Hospital where he received care which saved his life. After 47 days of hospitalization, Nakahara was well enough to be transferred to a Sasebo civilian hospital for continued treatment and convalescence. Commendation was received on behalf of the staff by CAPT Wilson D. Tucker MC USN, Senior Medical Officer of the hospital.

Aero Space Medical Meeting. The 17th Aero Space Medical Meeting of AGARD (Advisory Group for Aeronautical Research and Development of NATO) was held in Lisbon, Portugal, 10 - 14 April 1961. Subjects covered included Cardiovascular and Respiratory Problems, Clinical Aviation Medicine, and Space Medicine. CAPT Ashton Graybiel MC USN, Director of Research, U. S. Naval School of Aviation Medicine, Pensacola, Fla., presented a paper—Symptomatology During Exposure to Constantly Rotating Environment. CAPT J. P. Pollard MC USN, Director, Astronautical Division, BuMed, and Special Assistant for Medical and Allied Sciences, Office of Naval Research, participated as the U. S. Navy member on a panel; CAPT Roland A. Bosee MSC USN, assigned to the Air Crew Equipment Laboratory, Philadelphia, acted as the alternate Navy member. CAPT Bosee and LT C. F. Payne MC USN of the Naval Air Material Center, Philadelphia, are joint authors of a paper which was presented—Theory on the Mechanism of Vertebral Injuries Associated with Use of Ejection Seats. Also attending the meeting was CAPT Carl E. Wilbur MC USN, Federal Aviation Agency, Washington, D. C.

Pathologists Meet at USNH Chelsea. The 3rd regular meeting of the New England Society of Pathologists and the Massachusetts Society of Pathologists for the Academic Year 1960 - 1961 was held at the U. S. Naval Hospital Chelsea, Mass., 16 March 1961. Some 200 pathologists from the New England area attended the meeting which was arranged under the direction of CAPT Francis J. McMahon MC USN, Chief of Laboratories at the Hospital. CAPT William C. Turville MC USN, Chief of Surgery at Chelsea, presented a paper—Medical Uses for Frozen Blood. Other papers in the program were presented by distinguished civilians, including Donald A. Nickerson, Raymond A. McBride, Diane W. Crocker, and Franz von Lichtenberg.

USNH Memphis Blood Bank Accredited. A Certificate of Accreditation by the American Association of Blood Banks has been presented to the Blood Bank at the U. S. Naval Hospital, Memphis, Tenn. The Certificate makes the Navy Unit one of "a very few" of the 671 member banks so accredited. Hospital authorities state that the refinement in status culminated a year's intensive effort in which the unit met all "stringent standards" required. The Award was determined by a thorough inspection of technical and administrative procedures used by the facility in making its collections and expenditures.

20,000th Baby at St. Albans. On 1 March 1961, the 20,000th baby was born at the U. S. Naval Hospital, St. Albans, L. I., New York. The baby, a girl, was born to Basil J. Brooker, Storekeeper Second Class USN and his wife, who have three other children, all born at the St. Albans Hospital. In honor of the event, Mrs. Brooker was presented with a layette of clothing reserved for the occasion.

PHS Reports. Morbidity and Mortality (PHS, DHEW) for 31 March 1961 reported evidence of activity of the A₂ influenza virus in New York City. Since the first of the year, weekly pneumonia and influenza deaths have exceeded the 10-year average rate of between 55 and 66 deaths per week. The March weekly rates were 90, 114, 86, and 115. Throughout the remainder of the U. S., there has been no evidence of influenza activity; deaths due to influenza and pneumonia have been within limits of seasonal expectancy. As regards hepatitis, a sustained high incidence continues; 1914 cases for the week ending 25 March represented little change from the previous week.

New Species Honors CDR Kuntz. The author describes one of a collection of helminths from a parasite survey made in Egypt by CDR Robert E. Kuntz MSC USN during the period, 1948 to 1953. The species, differing from others previously described, has been named *Dentostomella kuntzi* in honor of the scientist. (Betty J. Myers, *Canad J Zool*, Vol 39, 1961)

Collagen Diseases. From Vanderbilt University School of Medicine, the author discusses some questions concerning collagen diseases which remain unanswered: Can the clinical classification of these diseases be categorical? Are the several collagen diseases pathologically and immunologically distinct? Is there an increased incidence of the collagen diseases? What are the etiologic factors? Case histories of various aspects of diagnosis and pathology of the diseases are presented in addition to some speculation as to possible answers to the questions. (R. H. Kampmeier, Arch Int Med, December 1960.)

Toxin Production of Staphylococcus. The amount of inhibition of toxin production by chloramphenicol, tetracycline, oxytetracycline, and oleandomycin was found to be directly proportional to the amount of inhibition of growth. Streptomycin and bacitracin were shown to inhibit toxin production to a degree significantly out of proportion to the amount of inhibition of growth; the absolute effect of these two drugs being increased by addition of chloramphenicol. (N. Hinton and J. Orr, Antibiot Chemother, December 1960)

Diagnostic Sign in Pneumothorax. The author describes a "scratch sign" which he considers to be superior to other signs in diagnosis of pneumothorax. The Bowles stethoscopic attachment is placed at some mid-line position on the chest, either over the spine or sternum; at equidistant points from the stethoscope, 7.6 to 20 cm from the stethoscope head, the skin is scratched with a finger or blunt object. The sounds from similar areas on the two sides are compared. A positive sign consists of a considerably louder and harsher sound on the side of the pneumothorax. (MAJ J. Lawson MC USA, New Engl J Med, January 12, 1961)

Glycerolized Frozen Blood. Blood processed with glycerol and preserved for prolonged periods of time at minus 80 C has functioned on thawing in an entirely satisfactory manner as an exclusive massive blood volume replacement during vascular surgery and extracorporeal circulation. There has been some concern for a peculiar syndrome of rising BUN and reduction of urine concentrating capacity despite large urinary output during the period after the second postoperative day in some instances. The severity of renal changes appears related to length of perfusion and is usually reversible. (LT T. O'Brien MC USNR, et al, Surgery, January 1961)

Rapid Test for Bacterial Sensitivity. An antibiotic susceptibility test is described—employing dry paper disks—which does not require use of agar mediums. The test is accurate (compared to the agar diffusion method) and can be performed in a shorter period of time—results obtainable from 2 to 6 hours—than is required by current standard procedures. (J. Brown, et al, Amer J Clin Path, January 1961)

DENTAL**SECTION**Resuscitation in the Dental Office

Peter Safar, Baltimore City Hospitals, Baltimore, Md., J Am D Soc Anesthes 7:5:4-8, May 1960, abstracted in Dental Abstracts, p 721, December 1960.

Being prepared for resuscitation in the dental office requires a minimum of equipment and drugs. The dentist's skill and judgment and his practical experience in the management of unconscious patients are more important than elaborate and expensive resuscitation equipment.

The key to successful resuscitation is immediate oxygenation. Speed is more important than the concentration of oxygen. A few effective inflations of the lungs sometimes are sufficient to restore failing circulation. Mouth-to-mouth breathing, with or without use of adjuncts, should be learned by all dentists and physicians.

The following step-by-step outline will prepare the dentist for rapid action in the event of a respiratory or circulatory emergency:

1. An open airway is provided. The patient is placed in the supine position, his head is tilted back and his mandible is held forward to prevent pharyngeal obstruction by the tongue. If necessary, an artificial oropharyngeal airway is inserted.

2. If there are no breathing movements, mouth-to-mouth breathing is begun. The S-shaped airway is used if it is available, but time should not be wasted looking for it. If a bag-mask unit with an anesthesia machine or an oxygen cylinder is available, another person should be asked to get it ready while the practitioner performs mouth-to-mouth breathing.

3. If the patient's lungs cannot be inflated, the pharynx should be checked for foreign matter. If there is solid foreign matter in the pharynx, the pharynx should be cleared with fingers or a cloth.

4. If there still is obstruction, probably it is caused by laryngospasm. Laryngospasm often can be treated successfully by an increase in inflation pressure. If this fails, the practitioner can perform orotracheal intubation or tracheotomy (if sufficiently trained to do so). Then the lungs are inflated by blowing intermittently into the tube. Blind nasotracheal intubation is not suitable for resuscitation.

5. If after a few lung inflations the patient still is apneic and a pulse cannot be felt in the carotid artery, the sternum is pressed forcefully

and repeatedly between lung inflations. This may squeeze the heart sufficiently between sternum and vertebral column to move blood. If the accident occurs in the hospital and there is a competent assistant, "open chest cardiac massage" (left anterior thoracotomy with manual systole) is indicated.

6. If the patient is breathing adequately, but his blood pressure is low or unobtainable, a vasopressor drug is injected intravenously, and the patient is placed in a supine position with the head lowered.

7. In the event of convulsions, adequate pulmonary ventilation is provided first, then a small dose of a short-acting barbiturate is injected intravenously.

* * * * *

Dental Caries and Periodontal Disease

Friedrich Wilhelm Proell, Johanniterstrasse 2, Bonn, Germany. Quintessenz 11: 69-70, March 1960; abstracted in Dental Abstracts, December 1960.

Dental caries and periodontal disease seem to exhibit, at least clinically, certain antagonistic tendencies. Teeth affected by periodontitis or periodontosis usually possess extremely hard enamel surfaces and are, therefore, resistant to caries. Periodontal disease and caries seldom occur simultaneously in the same tooth.

Etiologically, however, caries and periodontal disease have many things in common. Heredity, susceptibility and general health condition play important parts in development of both diseases. Environmental factors, especially a deficient nutrition and a neglect of oral hygiene, contribute much to the increase in the incidence of caries and periodontal disease. The actions of microorganisms within and without the oral cavity can be regarded only as secondary factors.

The course of periodontal disease depends mainly on the age of the patient, the state of his metabolism, and the presence of unfavorable forces and stresses. In contrast to caries, periodontal disease cannot be considered as being a "civilization" disease, because it occurred in ancient man and appears in recent primitive people and various animal species.

Disturbances in the autonomic (vegetative) nervous system seem to influence significantly the pathologic course of all forms of periodontal disease. Protraction of the jaw—usually caused by thumbsucking or other undesirable habits of children—often is accompanied by serious defects in calcification of the alveolar bone and by progressive degeneration of the periodontium. Many investigators have observed that in primitive people the thumbsucking habit did not influence the position or mobility of the teeth or

the condition of periodontal tissues. The resistance to periodontal disease, observed frequently in the aborigines of Africa, Asia, and Australia, seems to be related to their more natural diet (poor in sugar but rich in fluorine-containing fish).

In modern man, increasing susceptibility to caries obviously is promoted by hereditary factors, disturbances in development and growth during prenatal and early postnatal periods, defects in formation and calcification of hard tooth tissues, as well as by exogenous factors such as avitaminoses and other deficiency diseases.

The idiopathy of caries, however, is caused not only by hereditary or acquired defects in enamel or dentin structure but by an unfavorable environment (general and oral) and by nutritional deficiencies. Several investigators have demonstrated that the incidence of caries is comparatively low in geographic regions in which drinking water contains an adequate amount of fluorine (from 0.8 to 1.2 ppm). Caries-preventive procedures, therefore, should be initiated immediately, whether consisting in fluoridation of community water supplies, topical application of fluorine solutions or administration (adequately controlled) of fluorine tablets, and addition of protein, vitamins, and salts of calcium and phosphorus to the diet of children and pregnant women.

Recommendation of these measures to reduce the incidence of caries is based on results of numerous experiments carried out with human subjects and various animal species.

Unquestionably, caries and periodontal disease still are increasing because they are sequelae of modern man's unnatural way of life. He does not get enough sunlight, exercises insufficiently to keep the organs and functions of his body in a healthy condition, and he craves refined food which often contains too much sugar but lacks essential minerals and vitamins.

The majority of married women are now working, thereby neglecting not only the training but also the general care and oral hygiene of their growing children. Irreparable damages probably have been inflicted to the embryos during pregnancy.

* * * * *

Council Adopts International Temperature Standard

The Council on Dental Research, American Dental Association, at its December 1960 meeting adopted the internationally accepted standard temperature condition of $23.0 \pm 2.0^{\circ}\text{C}$. ($73.4 \pm 3.6^{\circ}\text{F}$.) and specified that it be used whenever applicable in American Dental Association specifications. The current specifications which are affected with the sections of the specifications and the previous specified temperatures are shown in the table.

This modification is effective immediately and was made in the interest of consistency and to conform to internationally accepted practice.

Sections of Specifications Affected by Change

Spec. No.	Specification	Section	Specified Centigrade	Temperatures Fahrenheit
1	Alloy for amalgam	4.3.1.	22 ± 2	71.6±3.6
3	Impression compound	4.3.1.1	20-25	68-77
4	Inlay wax (Effective July 1961)	3.5 4.3.1.1 4.3.1.2 4.3.3	20-25 20-25 20-25 20-25	68-77 68-77 68-77 68-77
8	Zinc Phosphate cement	4.3.1	18-24	65-75
9	Silicate cement	4.3.1	18-24	65-75
11	Hydrocolloidal impression material	4.3.3 4.4.5.1	20-25 20-25	68-77 68-77
12	Denture base resin	4.3.1.1	23 ± 1	73.4±1.8
15	Acrylic resin teeth	4.3.1	23± 1.1	73.4±2

The change was recommended by the Specifications Committee of the Dental Materials Group, International Association for Dental Research, which serves as a consultant body to the Council on matters relating to the American Dental Association's specifications for dental materials. (JADA 62:105-106, February 1961.)

* * * * *

STAR Program

Under the provisions of BUPERS INSTRUCTION 1133.13 particularly outstanding U. S. Naval first term petty officers and identified striker personnel may be recommended to the Chief of Naval Personnel for participation in the STAR Program (Selective Training and Retention).

Opportunities are available for Dental Technicians who want to make the Navy a career. Under the STAR Program, men who are selected and

who have served at least one year of active duty may be discharged for immediate reenlistment for a period which will give a total combined seven or more years of active service. The program is aimed at the top men in designated ratings in an endeavor to interest them in the Navy as a career.

Dental strikers who qualify and are selected for reenlistment in the STAR Program will be entitled to assignment to the Class "A" School. Those who graduate in the upper half of their class, and have completed six months in pay grade E-3 may receive advancement to petty officer third class if recommended by their commanding officer. An additional benefit will be a reenlistment bonus.

Nonrated dental technicians who have already graduated from "A" school and are accepted for career designation under the provisions of the STAR Program may also qualify for these incentives. There will also be opportunity for assignment to a Class "C" or "B" school as appropriate for qualified second and third class petty officers.

Both the Navy and its men will benefit mutually from this program; the men will have an opportunity for training, and the Navy will have the benefit of more obligated service from men who receive longer technical training.

* * * * *

Personnel and Professional Notes

DT Re-enlistment. For the first six months of CY 1960, 47.6% of the Dental Technicians in the U. S. Navy, who were eligible for release to inactive duty, have re-enlisted. This is a 34% increase in re-enlistments over CY 1959 and is the highest re-enlistment rate for Dental Technicians since the end of World War II. Re-enlistment statistics for December 1960 were especially noteworthy since 50% of the first-term dental technicians due for separation re-enlisted.

DOs Present Casualty Training Symposium. CAPTs T. R. Hamilton and J. C. Swearingen—Dental officers at the Dental Department, Naval Administrative Command, U. S. Naval Training Center, Great Lakes, Ill. —recently presented a Mass Casualty Training Symposium at the Alma City Hospital, Alma, Mich., sponsored by the Ninth District of the Michigan State Dental Society.

CDR Rovelstad Presents Paper. CDR G. H. Rovelstad DC USN—Staff, U. S. Naval Dental School, NNMC, Bethesda, Md. —recently presented a paper, The Role of Salivary Corpuscles, before the Washington Section, International Association for Dental Research, held at the Dental School.

CAPT Towle Lectures. CAPT Herbert J. Towle Jr, DC USN, Diplomate of the American Board of Prosthodontics and staff member, U. S. Naval Dental School, was guest lecturer on 3 March 1961 at the Medical College of Virginia's School of Dentistry, Richmond, Va. The lecture, Maxillo-facial Prosthetics, was presented before the senior class of the School.

DOs at D.C. Meeting. Naval Dental officers participating in various functions of the District of Columbia Dental Society's 29th Annual Post-graduate Clinic held 12-15 March 1961 were: Lunch and Learn Sessions—CAPTs G. W. Ferguson, J. E. Flocken, and J. B. Stoll. Symposium, The Dento-Legal Web—CAPT L. S. Hansen, Moderator. Projected Clinic, Denture Esthetics—CDR F. N. Kratochvil. Special Clinic, Subgingival Impression—CAPT J. E. Flocken. Table Clinics were: Multiple Unit Castings in Fixed Prosthesis—CDR B. F. Outlaw; A One Setting Technic of Endodontia Utilizing the Van Zile Canal Isolation—LCDR B. C. Terry; The Effect of Implantation of Tetracycline Cones in Socket Healing—CDR P. J. Boyne; Considerations in Mucogingival Surgery—CAPTs F. Dobronte and W. G. Hillis, and LCDR J. R. Elliott; The Effects of the Application of Heat on Gold Partial Casting—LCDR R. W. Elliott Jr; Orientation of Anteriors in Immediate Dentures—LCDR R. W. Pruden; and, Use of Bar Bridge in Partial Denture Support—CAPT W. Demer.

* * * * *

RESERVE



SECTION

Officer Hump Problem Besets Naval Reserve (Continued from previous issue)

In December 1960, a Naval Reserve Mobilization Disposition Board for captains was convened by the Secretary of the Navy for the purpose of recommending the removal from an active status of approximately 450 inactive line Naval Reserve captains and about 150 Staff Corps officers. This board was given the difficult task of deciding which of those officers, with at least 3 years in grade as captain as of 1 July 1961, would be removed from an active status.

The board was provided with broad ground rules to assist in making necessary recommendations. Among these areas of consideration were performance of duty as an officer, participation in the Naval Reserve Program,

potential for promotion to the grade of rear admiral, and age in grade when eligible for promotion to higher grade.

The Chief of Naval Personnel addressed a personal letter to each officer being considered, providing appropriate background information and explaining the necessity for immediate action. These letters served the purpose of advising each officer as to the general ground rules to be employed and also indicated that, if qualified for retirement with pay at reaching age 60, the individual officer might help by voluntarily requesting retirement if he so desired.

Letters sent to Staff Corps officers outlined special reasons for implementing non-continuation programs in respective Staff Corps. Although over-all numerical strength limitations apply to Staff Corps officers as well as officers of the line, these officers were informed that the Secretary of the Navy is required to screen the Naval Reserve annually to insure that a proper balance of military skills exists in the event of an emergency requiring mobilization.

The numbers of officers eliminated from an active status in the Staff Corps were proportionately less than those of the line. Approximately 50 medical, 30 dental, and 15 civil engineering officers were recommended to be removed from an active status in addition to the 450 line officers so recommended.

The board's recommendations were approved by the Secretary of the Navy on 23 Dec 1960 and individual officers were notified during February 1961.

In the future, the Navy proposes to reconvene the Naval Reserve flag selection board each fiscal year as a non-continuation board which will recommend removal of requisite numbers of captains in order to provide for an equitable promotion flow to succeeding year groups.

It is anticipated that fiscal years 1963 through 1966 will see the hump problem become acute in the grade of captain. During these years the field of officers eligible for promotion each year will become huge by comparison with numbers of officers now eligible.

It is estimated that from 500 to 600 line commanders must be promoted each year during this period, thereby aggravating the problem of remaining within the 1800 line officer ceiling for captains.

Commander Non-Continuation. Considering the hump problem on a purely numerical basis in the grade of commander, it should be pointed out that the Naval Reserve now has approximately 12,000 line commanders on board in an active status. It has to be reduced to the ceiling of 8400 by 1 July 1964.

These numbers represent the strength of the Naval Reserve in the grade of commander today and therefore do not provide for additional numbers of lieutenant commanders to be promoted. Congress, in consideration of the magnitude of the commander problem, recognized that an immediate requirement to drop over 3600 commanders would produce a corresponding drop in

officer morale.

The four-year grace period specified under the law was intended to afford an orderly phased reduction in size. In view of this, and because senior officers in the Naval Reserve were not thoroughly cognizant of the new requirement to maintain statutory numerical ceilings, a one-year postponement of the non-continuation program was approved by the Secretary of the Navy.

Accordingly, the first attrition program will go into effect during fiscal year 1962 for the commander grade. The selection board for captain which is planned to convene in January 1962 will be given the additional task of recommending the elimination from an active status of certain numbers of officers in the grade of commander.

This will be a continuing requirement for each succeeding selection board until the hump problem eases. It is hoped that this may be done by fiscal year 1965.

Commanders For Removal. As presently approved, the captain selection board reconvened as a continuation board will consider only those officers two or more times passed over for selection to the grade of captain.

Only 35% of those commanders who are two or more times passed over within a particular year group will be removed from an active status. Normal attrition will account for many other officers being removed from an active status, but such action will result from administrative procedures already in effect in the Naval Reserve program. Officers who fail to earn 12 retirement points each year are transferred to the Inactive Status List. Other officers who are in the two-time pass-over category and who have earned 20 years of satisfactory Federal service are removed from an active status.

This attrition closely parallels the Regular Navy program for continuation of commanders on active duty. The percentage of officers removed from an active status in the Naval Reserve will be almost identical to the percentage of Regular Navy commanders non-continued. (The Naval Reservist, March 1961.)

* * * * *

American Board Certifications - Inactive Reserve

American Board of Internal Medicine

LT Richard J. Conroy

LT David H. Lewis

LT Thomas F. Sellers, Jr.

LT Morton E. Shafran

LCDR Stanley Wallach

American Board of Obstetrics and Gynecology

LCDR William D. Bergman

LT Ira Goldberg

LT Edward C. Sargent

American Board of Ophthalmology

LCDR Robert B. Boomer

LT Robert L. Frank

American Board of Pediatrics

LCDR Marion E. Alberts

LCDR Harry W. Van Dever

American Board of Preventive Medicine in Public Health

LCDR Jacob E. Wyatt

American Board of Psychiatry & Neurology in Psychiatry

LT Harold W. Arlen

LT Arcangelo M. Calobrisi

LCDR Robert B. Forman

American Board of Radiology

LCDR Robert C. Flipse

LT Sigurd E. Johnsen

American Board of Surgery

LT Edward P. Goddard

LTJG Joseph L. Schwartz

AVIATION MEDICINE DIVISIONMedical Aspects of Liquid Oxygen Contamination

Roscoe G. Bartlett Jr, PhD, Naval School of Aviation Medicine, Naval Aviation Medical Center, Pensacola, Fla.

Shortly after liquid oxygen came into fleet use as a source of oxygen, for breathing, there were occasional complaints by aviators of unusual odors in the oxygen; sometimes pilots attributed various bouts of sickness during flight to breathing oxygen. These early complaints led to analysis of liquid oxygen to determine the types and concentrations of

any contaminating materials. Initial studies were made at NAS, Alameda, followed by those made by two universities under Navy contract.

The results of these earlier studies have now been verified by a large number of laboratories. Many thousand samples of liquid oxygen have been analyzed in many different laboratories; we are now quite certain

as to the contaminants usually to be found. These include small amounts of carbon dioxide, methane, ethane, ethylene, acetylene, traces of higher hydrocarbons, nitrous oxide, water vapor, traces of halogens and, occasionally, trace amounts of unidentified substances.

Methane is almost always the most concentrated contaminant and is never above 25 parts per million. (If higher, the shipment is rejected when delivered.) It, and apparently most other contaminants, is somewhat concentrated as the liquid oxygen boils off; therefore, the concentrations of contaminants are somewhat higher when breathed than when delivered. It must be stressed that none of the contaminants found in liquid oxygen are significantly toxic materials, and are certainly non-toxic in the concentrations found.

Unidentified substances are present in such small amounts that, unless an, as yet, undiscovered type of toxin is involved, they could not be toxic. The question of possible combination effects acting synergistically to produce toxicity has been raised. Considering the individual toxins involved, such a mechanism seems impossible.

With odors, the story is different. Most of the contaminants which have been identified are nonodorous in the concentrations present. In fact, it has been demonstrated at the U. S. Naval School of Aviation Medicine that the identified contaminants are very likely not responsible for the odors that sometimes are associated with liquid oxygen. Pilots could not detect by odor a sample con-

taining contaminants in concentration levels fifty times higher than the concentration of contaminants found in even badly contaminated liquid oxygen. However, since the nose can detect some substances in concentrations of much less than one part per billion, it is likely that there may be several or many unidentified contaminants which could cause odors and which are present in concentrations of less than a fraction of a part per million; this is approximately the resolving power of the infra-red and mass spectrographic instrument used in searching for liquid oxygen contaminants.

The odor problem in liquid oxygen is further complicated by the fact that the contaminants are not always evenly distributed in liquid oxygen, but may be present in small discrete crystals as a result of the very low temperature of liquid oxygen. During use, crystals may be pulled into the converter where they meet, perhaps as a result of a temporary lessening in the pilot's demand for oxygen and consequent warming of the distal portions of the converter giving rise to a surge of odor. This means, of course, that liquid oxygen which has passed a smell test may produce fleeting odors during flight.

Although the identified contaminants apparently are not involved in producing the odor, it has been observed repeatedly that the likelihood of in-flight odors increases when the concentration of these identified contaminants is high. This means that the concentration of the unidentified odor-producing substances is also increased. Continued surveillance

by the Navy Material Testing Laboratories keeps delivered liquid oxygen within the specifications and assures a low level of contamination, thus reducing the frequency of occurrence of odors.

The relationship of Navy specifications (for maximum acceptable levels of contamination) to toxicity levels has not been made clear. Actually, there is no relationship. None of the identified substances present is toxic in concentration levels even one hundred times as high as the maximum acceptable levels. However, when the contamination levels exceed Navy specifications, there are increasingly frequent complaints of abnormal odors. As the result of a number of observations and studies with industry, the present specifications have evolved as the description of a product that industry, with reasonable care, can produce. Since increasing contamination is objectionable from both odor and mechanical viewpoints (e. g., freezing of valves with increased water contamination), it seems wise to accept only the best product that can be made with reasonable quality control.

Even though toxic levels of contamination in liquid oxygen have probably never occurred, this does not mean that aviators cannot become sick while breathing gaseous oxygen evolved from the liquid oxygen. Levels of contaminations capable of causing odors probably occur frequently. As a matter of fact, it has been demonstrated at the U. S. Naval School of Aviation Medicine that some aviators can differentiate by olfaction (smell) between any two pairs of

cylinders of compressed aviators' oxygen for breathing taken from stock at NAS, Pensacola. This means that all compressed oxygen has an "odor" to persons with higher than average olfactory acuity. In spite of this, complaints of off-odors in compressed gaseous oxygen are rare when such oxygen is used.

Complaints of odors are considerably more frequent with liquid oxygen use; laboratory analysis shows liquid oxygen to have higher levels of contaminating substances than compressed oxygen. Even those aviators with usual or low olfactory acuity may detect odors in the breathing oxygen when the purity of source is a matter of concern to them and they are thus "looking" for odors. At any rate, it is perfectly reasonable that odors should frequently be detected when liquid oxygen is the source of the breathing gas.

Many or most of these odors are likely ignored as are the countless odors with which we are constantly bombarded each day. Once an odor is detected or reaches a conscious level, especially if it is not expected and is mentally associated with toxicity, it is easy to envision the psychologic exaggeration of the odor to "toxic" proportions. Such apprehension is frequently associated with hyperventilation which produces real symptoms, adding to the apprehension. The vicious cycle of events initiated by concern over an "odor," which may or may not be real, can easily lead to an illness that may range from simple nausea to vomiting and even unconsciousness. When aviators report persistent odors, one

strongly suspects an imaginary or hallucinatory basis for persistence of the odor. As a result of rapid olfactory adaptation or fatigue, even rather strong odors persist for only a short while.

In summary, the present knowledge of the liquid oxygen contaminant problem seems to indicate certain findings. All oxygen may contain traces of several contaminants. These contaminants never singly, or probably in combination, reach toxic levels. Accidental contamination by detergents left in the storage tanks, et cetera, is detected quickly if the oxygen is analyzed and tested by smell. Oxygen which has passed such tests is certainly safe for use. This does not mean that such oxygen

evolved from the liquid source may not have an odor. In liquid oxygen contaminants may not be distributed evenly, but may be concentrated in discrete frozen crystals. Thus, a sample could pass a smell test, but, in use, have a temporary odor as the crystals of contaminants melt. The olfactory mechanism is extremely sensitive and may detect an odor which is neither identifiable nor detectable by customary analytic methods. After an odor has been detected, the vicious cycle of apprehension, hyperventilation, increased apprehension, increased hyperventilation, et cetera, which may lead to real physical and psychologic debility is easily imagined.

* * * * *

Aviation Occupational Health Hazards

The following items have been excerpted from Occupational Health Hazards, Bureau of Medicine and Surgery: Release No. 26, dated 1 February 1961, and deal specifically with hazards encountered in operating or working with aircraft.

Dermatitis from Headset. Twelve cases of dermatitis ranging from mild redness to heavy vesicular eruption have occurred recently in military aircrew personnel wearing a new headset (RM 5965-676-0906-E212 replacing R5965-32402333-E212). The affected area was limited to the ears and skin immediately around the ears. The cup for earphones is covered by a soft pliable rubber seal with a separate interior foam rubber insert; this insert cannot contact the skin in normal usage. Itching, redness, and vesicular eruptions started after contact periods of from less than 2 minutes to 8 hours or more. Others with equal exposure were unaffected. Patch testing of 11 individuals with portions of the rubber seal for 6 to 8 hours gave negative results (4 of these were from the 12 dermatitis cases). Dermatitis cleared uneventfully within 2 to 7 days with symptomatic treatment. Although there were no reactions to patch testing, the incidence of at least 2 cases of dermatitis in the area of

contact of the earphone rubber seal coinciding with, and limited to, use of the new headset, forces the conclusion that the rubber seal is the causative dermatitis agent.

Noise Suppressor, Aircraft. In line with current policy of BuWeps, one station undertook to evaluate the possible utilization of all aircraft sound mufflers on hand. The Koppers muffler stood the test well but attenuation was poor; actual intensification of the noise was experienced at great distance because of the 90° shift of the field of noise. The Curtiss-Wright mufflers (both unmodified and modified) disintegrated rapidly under afterburner conditions, but gave substantially better attenuation. Considering that the afterburner was brought to 6" distance from the muffler and that estimated nozzle temperature is 1500°, the sintering and disintegration of the internal structures of the muffler is understandable. It was recommended that further tests be conducted keeping a reasonable distance between afterburner and muffler and shielding the sides of the gap.

Evaluation of effectiveness of a Curtiss-Wright noise suppressor used with an F8U aircraft revealed that substantial noise reduction, up to 25 db at the angle of maximum noise propagation at 250 ft, is obtained when the system is properly coupled. The suppressor did not appear capable of enduring the 15 sec afterburner test due to buckling of the front grate assembly. The suppressor is structurally able to withstand the tests at military power.

Evaluation of the General Sound Control Noise Suppressor using a J-57-P-8 engine and watercooling revealed that the suppressor is structurally inadequate for use with afterburning engines. Copious clouds of steam and hot water released by the suppressor during the afterburner tests are potential burn hazards and also seriously affect the engine performance. During the tests, as much as 3000 lb. of thrust loss was attributed to this cause. During full power (non afterburner) runs, the radiant heat from the suppressor body was so great that it was impossible for the operator to approach the engine trimming stations. Acoustical performance of the suppressor was somewhat less than that specified, but was comparable to the performance of other suppressors' tests.

Evaluation of the Maxim Company jet noise suppressors on J-34 engines on P2V aircraft indicates that substantial noise reduction is being attained. For this type engine, use of this suppressor may permit bringing the aircraft test stands nearer to the hangars thus saving man-hours and towing costs.

A limited project in May 1960 (not included in the Quarterly Report Narrative) was set up for comparative sound attenuation of three types of "portable sound suppressors." Testing was done with a J-57 engine on a test stand in an isolated area. A separate data sheet was made on each (Curtiss-Wright, Industrial Acoustics, and Maxim) suppressor. Test results indicated that these sound suppressors alone are of some

value for community noise, but that substantial sound fences or enclosure of the entire aircraft would be necessary to give any significant attenuation in the immediate vicinity of the aircraft or areas forward of the suppressor. Variation in the attitude of aircraft as power is applied, and extensions of the tail assembly past the exhaust exit prevent exact mating and flush alignment of the exhaust and the suppressor intake. Resulting resistance causes excessive heating of the tailpipe making engine trim impossible and limiting severely military power turn-up. A recent modification (September 1960) of the Industrial Acoustics Corporation sound suppressor was intended to improve sound attenuation for test stand use,

age, but no attempt was made to eliminate the problems associated with turn-up of the engine in the aircraft. Practical application of present portable sound suppressors is questionable.

Nonionizing Radiation: Radar. Microwave exposures were investigated near a TACAN tower, near an open aircraft repair area (no hazard was found), and in a radar training room where combined continuous wave and pulsed waves were delivered resulting in multiple reflections within the room and transmission through plaster walls in excess of current limits. It was recommended that the unit be operated on dummy load and that live antenna work be restricted to a minimum.

* * * * *

MISC
EMB
2
11
2

US NAVAL ATTACHE
CENTRAL, BIRMINGHAM
% GENRAL
NAVY DEPT
WASHINGTON 25, D.C.

STC

POSTAGE AND FEES PAID
NAVY DEPARTMENT

DEPARTMENT OF THE NAVY
U. S. NAVAL MEDICAL SCHOOL
NATIONAL NAVAL MEDICAL CENTER
BETHESDA 14, MARYLAND
OFFICIAL BUSINESS
Permit No. 1048